2: Underhill E-5 (1931-1935)1939 NU28 Papago NU28

221 423 222 village located a good grove in the foothills nearest it and the families chose their camping sites there. In this case there was no consultation with the Council for the cactus groves were very extensive and there was plenty of room. Nearly related families placed their camps together with a picking grove around them a half mile or more square, or such that the women of the combined families could just manage to keep the groves picked clean as the fruit ripened. The next campers settled far enough away so as to give themselves room and not interfere. No one would settle near an established camp unless he was a relative and then only after asking permission and no one, looking for a new camp, would go to the hills already pre-empted by a village not his own.

However, residents of one village often asked their relatives from another village to make cactus camp with them; married daughters came back to camp with their families and people who had formed new Field villages used the old cactus camp. This shifting of personnel furnished almost as much excitement as the journey to a ceremony and formed a relief for relatives living in close contact the rest of the year.

221 273 222 423 A family thus using the cactus grove of a village not their own felt bound in honor to bring the gathered juice to the ceremony of the host village. Tradition says that, in the old days, all juice was fermented in the council house with none kept for private consumption. That constituted the guests ceremonial laborers for the host village. At present a great deal of the liquor is used for home consumption and people want more of it. Also they are less willing to camp in the waterless groves where water has to be transported a long distance and they are beginning to encroach on the groves of people camped in the more accessible places. "But I would not say anything," said a man who had suffered this. "The cactus is for all. We did not make it and the people who pick it are bringing rain." A woman, less tolerant, followed the trespassers all the way out of the grove, scolding them. But the rest of her family disapproved and would say nothing. The Papago tradition of peaceableness was strong.

221 222 423 [252] The cholla and the prickly pear grew in the same general locations as the giant cactus and when they were in season the women of the family went back to the cactus camp for two or three days, drying or eating the prickly pear and pit-baking the cholla on the spot. For each of the other staples they had a special location: mesquite beans by the washes, yucca on hilltops; roots and greens in low wet places. There were no family camps in these gathering grounds but each was understood to be pre-empted by a village or by several related villages.

3: Underhill E-5 (1931-1935) 1936
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Then the girls put the nets on their backs and if one was married and had a baby, she put that on top in its cradle board. Some men went with them with their war arrows because there were Apaches in the land then. They all went running, running. If they saw dust in the distance that they thought was Apaches, they went dodging behind the giant cactus. You see, women had to run in those days. That was what saved their lives. Many hours they had to run, and when they came back every family had two little jars of water to last for the day. But we did not mind. We knew how to use water. We have a word that means thirst-enduring and that is what we were taught to be. Why, our men, when they went off hunting, never drank at all. They thought it was womanish to carry water with them.

My brothers went running off, too. Ah, how we could run, we Desert People; all the morning until the sun was high, without once stopping! My brothers took their bows and arrows and went far off over the flat land.

"Run," my father said to them. "Run until you are exhausted. So you will be a strong man. If you fall down tired, far out in the waste land, perhaps a vision will come to you. Perhaps a hawk will visit you and teach you to be swift. Perhaps you will get a piece of the rainbow to carry on your shoulder so that no one can get near to you, any more than to the rainbow itself. Or maybe Coyote himself will sing you a song that has magic in it."

So they went off in their breechclouts and bare feet, running in the dark when they could hardly see the cactus joints on the ground and the horned toads—rattlesnakes there were not in that cool weather. One of my brothers did really have visions. The others used to come back without him, bringing jackrabbits for our dinner. The little boy would come in much later and never tell where he had been. But we found out long, long after, when he became a medicine man, that he had been lying dead out on the desert all those hours and that Coyote had come and talked to him.

When they were gone my mother would come crawling out. She went to the little enclosure beside our house, made of greasewood bushes piled up in a circle and she got the pot of gruel. We always kept gruel in our house. It was in a big clay pot that my mother had made. She ground up seeds into flour. Not wheat flour—we had no wheat. But all the wild seeds, the good pigweed and the wild grasses. And corn, too! Some summers we could grow corn. All those things my mother kept in beautiful jars in our storehouse. Every day she ground some more and added fresh flour to the gruel and some boiling water. That pot stood always ready so that whoever came in from running could have some. Oh, good that gruel was! I have

3: Underhill E-5 (1931-1935) 1936
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never tasted anything like it. Wheat flour makes me sick! I think it has no strength. But when I am weak, when I am tired, my grandchildren make me gruel out of the wild seeds. That is *food*.

I used to help my mother. When I was very little I began to grind the seeds, just for a short time. When I was ten years old I did it all, for then a daughter should be able to take over the work and let her mother sit down to baskets. But I am telling you about the early days when I could only grind a little. Then we pulled the grinding slab inside the house by the fire and my mother knelt behind it. I picked the dirt out of the seeds and handed them to her, and the pot boiled on the hearth on the three stones that we kept there.

My father was very busy, for he was the chief of our village. People used to bring their quarrels to him, and I remember him sitting crosslegged under the arbor we had to keep off the sun, listening with his head bent and his arms folded, while people talked.

"My daughter disappeared with a man on the last night of the maiden's dance. I want her beaten." "How many stripes?" "Twenty." "Fifteen," said my father. He was a gay man who liked to war and to gamble. He did not like to beat women.

Some days nobody would come, and then he would gamble with the other men, throwing the sticks that we use for dice, and then moving stones around a circle as many moves as there were marks on the stick. We used to hear the men singing in a low tone, before they threw, to give them luck:

> Down I shall throw
> The smooth stone I shall move
> Move it to the corner.

They smoked, too, and I can smell their tobacco yet, the strong wild tobacco that we do not have any more. It was tied in a long corn husk, so white, so nice, and when one man passed it to another he said: "Friend!" And the other said, "Friend."

When the sun was high, high, my brothers and my sister came home, and as each one came my mother gave them food. She dipped the gruel out of the pot into a bowl, for my mother was a good potter. We all had bowls in our house. Only my father and my mother ate out of the same one laughing together, because they liked each other. When my mother dipped out our food she said: "Do not eat it hot. You will have wrinkles." She set mine on the grinding slab to cool. "It will make you industrious," my mother said. My father said to the boys: "Do not eat it hot, no matter

3: Underhill E-5 (1931-1935) 1936
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too, and said to them: "Now you'll be a good runner, a hunter, able to stand cold and hunger. A Killer!" Those are the things that come to us, the families of the powerful. 159x 727 783

The rest of our family were getting ready for the dance. All the old Enemy Slayers were going to sing for my father to take him back again when the four times four days were over. My grandmother boiled big pots of dried corn and dried squash and succotash, to give those singers food. [252] All my father's sisters and the wives of his brothers made tortillas. The young women of our family brought wood for the dance fire. My father's brothers counted how many cows and horses they could give to the dancers. Our family did not have much because our men were always fighting. They were brave.

At sunset, when the four times four days were over, the people came to the dance place. Then they brought my father and the Enemy Slayers and us, too. They did not take us to the fire. Far away in the cold they dug four little holes and there the Slayers sat, facing east. Behind them there were holes for their wives. They must sit up all night, straight and not move. They had stakes driven into the ground behind them so they could lean back a little when they were too tired. My grandmother sat with us children far away in the dark. 159x 727 783 635

The people went around the fire singing. [533]

Kill the Apache, kill the Apache!
Dry the skin, dry the skin!
Soften it, soften it!
Hang it up, hang it up!
A-a-a-a-a-a-h!
There are still some Apaches left.

I could not hear the songs that night when my father was a Slayer but I know them now, for I learn well. I learn everything that the men sing.

The people stopped going around, and a man came into the middle to dance the warrior's dance. Only a young man can do that dance. He holds the shield and a club, and first he leaps to one side and then to the other as though the enemy's arrows were flying at him. Then he leaps up and lets them pass under him. Behind him, other young men, or maybe women, if they are strong and wild, take bows and arrows and leap as he does. The singers sing for them.

Sitting with my back against the dawn [533]
I got drunk, my younger brothers.
I met the white wind and it drove me mad.

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Anciently the Piman method of harvesting maize was to pull up the entire plant, or, in some cases, break it off at the ground, and throw it in piles, care being taken to keep separate the several colors of corn, since they had been planted in different plots; this was man's work. One reason for pulling up and removing the stalks was to have the field cleared for the next season. After Spanish contact, plants were sometimes cut off at the ground with an iron implement. Another historic development associated with turning stock into the field to eat the stalks was to husk the corn directly off the standing plant, the stalk being allowed to remain. The individual first ran a sharpened, hard stick of creosote bush or mesquite through the husk, then broke the ear out and threw it on a pile. In any event, harvesting was begun at a convenient place in the field, and did not proceed by designated direction as among some of the Pueblos. There was no ceremonial restriction against burning the husks, cobs or stalks. Cobs were used as fuel, particularly in cooking, and some stalks might be used in building the walls of a new structure. Saving purple husks to be used as a source of dye was unknown.

Pi' Pa 241

Pi Pa [342] [373]

The plants were piled in one or more heaps, depending upon the size of the field, and women and older children usually gathered around the piles to remove unhusked ears from the stalks and throw them in piles. These ears were then carried to the dwelling in burden baskets (figured by Densmore[3]) by the women.

Although the Pimans husked some of their maize, particularly in selecting ears for seed, it was the common practice to partially roast their corn in unhusked ears by placing it in piles and covering with brush; this was set afire, green mesquite branches being used to stir and turn the ears, and, after several minutes of roasting, to throw them out on a bed of grass. During the roasting process much of the husk was burned away. These ears were dried on top of the house for

Pi' Pa 251 252

[3] Densmore, *Papago Music*, pl. 10.

5: Castetter & Bell N-5 (1938-1940 1942
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about ten days. Should rain come while the corn was drying, no special effort was made to protect it, as it was considered the corn would soon dry out uninjured, particularly if the ears were rearranged. One informant said the best way to determine whether corn was dry enough to be stored without molding was to test a few kernels by crushing with the teeth. Another said his method was to take a small handful of grains and shake them, the sound being an indicator of their dryness. Many of the Pima and Papago continue the roasting practice, and it is still not uncommon to find among both peoples storehouses in which partially roasted maize has been stored away unhusked. In some cases the process differed to the extent that the fire was made in an open pit and, when it had burned down, the ears were thrown on the embers to roast. It was considered that such partial roasting improved the keeping qualities and facilitated the grinding of corn.

A less frequent procedure, practiced mainly by the Papago, was to husk some of the ears and remove the grains, then parch and dry them on a sotol mat on the roof.

Shelling

Pima and Papago corn was regularly shelled before storing. After thoroughly drying, the unhusked, partially roasted corn might be shelled in any of three ways. The first, used with small quantities, was to remove a few grains at one end of the ear, then knock off the rest with the butt end of a cob. The second was to remove one or two rows of kernels the length of the ear with the aid of a stone scraper or a sharpened piece of creosote bush wood, then finish by twisting the ear with the hands. Finally, and most common, if one had a considerable amount of corn to be shelled it was placed on a sotol mat or cotton cloth and beaten with a club, then grains remaining on the ears were removed by hand. Unlike some of the Pueblos, there was no difference in the way seed and food corn were shelled. This was woman's acknowledged

5: Castetter & Bell N-5 (1938-1940) 1942
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 Pi Pa

This was women's acknowledged work in which the man seldom participated, and after corn was shelled it was woman's work alone to care for it. At present many of the Pima and Papago have mechanical shellers. Shelled corn was placed on a mat or cloth and again allowed to dry for two to three days. Grains were then winnowed in a large basket by tossing into the air to remove chaff. Or this might be done by tilting the basket about four feet above ground and allowing the kernels to fall gradually on a sotol mat or cotton cloth. Corn was always shelled before being stored, then was ground into meal as needed. [1462] 251 252

Storing Food Corn

Crops were never hidden by the Pima for protection from enemies. These Indians usually stored their corn, after shelling, in large cylindrical nest-like bins, or granaries, made of crudely coiled, thick bunches of arrowweed, which were very durable and lasted for years. They needed no base, since the roof or platform upon which they rested served this purpose, although a layer of arrowweed was spread on the spot where they were to stand. Over this granary was a low, cone-shaped roof of arrowweed extending beyond the rim, and covered with dirt. A cotton cloth was sometimes placed beneath the roof and over the contents of each bin. Varying considerably in size, the average bin was about eighteen inches tall by three feet in diameter. Their manufacture has been described in detail and figured by Kissell.[4] Pi Pa 251 415 286

These Pima granaries were usually placed on the roof, less commonly in groups on a platform of logs to keep them above the ground. Small sticks were placed across these logs and covered with arrowweed branches, which also served as a base for the bottomless bins. In post-Spanish times, groups of such granaries on a platform were enclosed by a low fence for protection against stock. In this connection, the reader is referred to Emory, Russell, Clark and Kissell.[5]

[4] Kissell, *Basketry of the Papago and Pima*, pp. 173-90.

[5] Russell, *op. cit.*, fig. 4; Clark, *Lessons from Southwestern Indian Agriculture*, fig. 12; Kissell, *op. cit.*, figs. 29, 30; Emory, *op. cit.*, p. 85.

5: Castetter & Bell N-5 (1938-1940) 1942
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and dried seed corn was to be stored it was mixed with wood ashes and placed in ollas. Among the Pima, a cotton cloth was then placed over the top of the olla and sealed with mud made of saline soil, while the Papago usually sealed such ollas by applying mud mixed with grass to the improvised lid. All the seed placed in an olla was of a single color and type, and there was never any mixture. Seed corn was eaten only in case of emergency. No seed or food crop was ever stored in hides.

In some cases seed ears were braided together in clusters by means of their husks, hung outdoors until dried, then suspended from the ceiling in the house.

There was no storage ritual for either food or seed corn.

Utilization of Corn

Informants said blue corn was used mostly for parching, white regarded as best for pinole and yellow as most suitable for tortillas, although these categories were not always maintained. The Pimans utilized a good deal of green corn for food, but in no case was a special planting made for this purpose, such ears simply being removed from regular crops. Several informants said it took a little more than "two rounds of the moon" from time of planting to get good roasting ears —about nine to ten weeks. This conforms with our own observation that native Pima and Papago corns produce silks and tassels within fifty to sixty days after planting. One way of determining its suitability for this purpose was by the condition of the silk, selection being made before the silk became entirely dry; another by judging the hardness of grains through the husk. It was eaten in a variety of ways; for example, directly off the ear after roasting unhusked on the embers of a mesquite brush fire, or such roasted corn was dried, then the grains cut from the ear and stored in ollas or shallow baskets; sometimes the grains were scraped from the ear, placed inside several corn husks, wrapped and tied at the ends with shreds of husks, resembling a tamale, and boiled.

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Paper bread was unknown to the Pimans. Corn pollen was never utilized, even ceremonially. One informant said that, as a boy, he used to see people putting ears heavily infested with corn smut on coals to roast, then taking off the smut and eating it without other preparation. The standard Pima meal consisted largely of cornmeal gruel.

Pumpkins

Time of Harvest

As indicated earlier in this chapter, the Papago made one planting of pumpkins—when the rains began in July, and this was harvested in October; the Pima made two plantings—the first when mesquite began to leaf out in spring, the second immediately after sahuaro harvest in July. The first sowing was harvested in late June, the second in October. All their varieties of pumpkins were sowed at the first planting, only cushaws in the second. Piman pumpkins were usually harvested after maize and teparies had been put away, for many were still unripe at the maize harvest. Color of the fruit indicated whether they were mature enough to be gathered, the cushaw type usually ripening first, the cheese pumpkin last. It was known that light frosts would do them no damage, so it was not necessary to bring them in before that time.

Method of Harvest

Anciently it was woman's work to gather the pumpkins. Varieties were sorted into separate piles in the field to avoid a second handling, then carried to the house in a burden basket. Neither Papago nor Pima left a portion of the vine attached to the fruit, as was done by some tribes, but in severing pumpkins from the vines care was taken not to break the fruit stalk away from the pumpkin itself, otherwise it would rot readily.

Storing

The average family had a crop of sixty to one hundred pumpkins, which were stored immediately after gathering.

5: Castetter & Bell N-5 (1938-1940) 1942
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They might be placed in a pile outdoors and covered with corn stalks, particularly if the crop were large, but more commonly were piled up in the storehouse with or without a covering of corn stalks. They could be kept at least until February, and in some cases as late as April. Cheese pumpkins kept best and longest, while the cushaws were recognized as poor keepers. If a pumpkin was seen to be rotting in storage it was sliced, then dried, in the manner described below for storing dried pumpkins; if disintegrated, it was discarded. Pi Pa 251

Anciently, each Pima home was provided with a single storehouse, generally an oval pit about eight feet long and two feet deep, covered by a gable roof of willow branches thatched with arrowweed. A forked pole of mesquite was set at each end of the oval and a beam placed lengthwise of the pit set in the forks of the poles. Willow branches were stuck into the ground along the brink of the pit and leaned against the beam. This storage house was used for pumpkins and, in historic times, watermelons and the like. It was practically identical with that described in detail by Spier[11] for the Maricopa. The same structure, with modifications, is still to be seen among the Pima. It is a cubical pit about three feet deep and as wide and long as required for the supply, now used exclusively for storing pumpkins. The floor of the pit is a layer of poles or logs covered with corn stalks on which the pumpkins are piled. In each corner is an erect forked pole, with cross beams of sahuaro ribs, and a rough arrowweed or cornstalk roof, and finally the whole covered with dirt. Pi 251 343

Utilization of Pumpkins

When frost came, many pumpkins were still unripe and in various stages of development. These, particularly the cushaw type, were never discarded, but the skin removed by scraping, the flesh cut into pieces, cooked, usually with mesquite beans, and eaten immediately. At times, small immature pumpkins were gathered during summer and cooked Pi Pa 252

[11] Spier, *Yuman Tribes*, pp. 89-90.

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Pi Pa 252 as a green vegetable, either whole or in pieces. Often they were cooked with rabbit meat. Immature pumpkins were also sliced thin and dried, and were said to be like fresh slices when soaked in warm water; these were boiled and eaten. Informants stated the first small green fruit was ready for use within five weeks after planting.

Ripe pumpkins, chiefly cushaws, were stored, then utilized throughout the winter as needed. They were simply cut into two-inch cubes and cooked in an olla, sometimes with mesquite beans, until soft and mushy, or into large pieces and roasted. The cheese pumpkin was regarded as having the best flavor of all Piman varieties, but the cushaw was the only one used to any great extent without drying.

The customary method of drying ripe cheese pumpkins for winter use was to remove the seed through an opening made by cutting out the fruit stalk. After peeling, the pumpkin was allowed to dry for about two days in the sun, then cut into one or more spiral strips about an inch wide, and hung on poles, or laid on top of the house in the sun for about six days. These were twisted into hanks, dried thoroughly and stored in baskets or ollas. When needed they were broken into pieces and boiled, usually with cornmeal.

Soft-shelled pumpkins were best for making strips and drying, and the cheese pumpkin therefore was regarded as most desirable for this purpose. Hard-shelled varieties, chiefly the cushaws, were best for roasting and were the only ones used to any great extent in this way; their only variety of *Cucurbita Pepo* was regarded as good for roasting but not for drying in strips, and for this reason was not more extensively grown. Pumpkins were roasted by burying the halves in the hot ashes of a corncob fire, a whole day being required.

Pima informants said that, at times, the flesh was scooped out of a greenish black variety of cushaw and the hard shell used as a storage container.

Pumpkin flowers also were eaten by both Papago and Pima, but usually only the male flowers since they did not

5: Castetter & Bell N-5 (1938-1940) 1942
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develop into fruits. A quantity was gathered early in the morning and, after removing the calyx, dried in the sun on a mat or cotton cloth for about three days, then stored in a sealed olla. When used they were cooked with mesquite beans. At times, they were mixed with cornmeal and boiled, the mixture spread out on grass or a cloth to dry for about three days, and stored in ollas. This was again boiled when utilized. Twisted flowers, after removal of the green calyx, were also boiled and eaten with pinole.

Papago and Pima regarded pumpkin seeds as a delicacy. These were parched by placing in a piece of olla with live coals, stirring until done, and eaten much as we eat peanuts; or at times these seeds were parched with corn.

Seed Selection

Pumpkin seed was selected in a general way (by either the man or woman) by simply taking those from the largest pumpkins, size being the most important criterion. Or, if a pumpkin proved to be especially sweet, the seed was saved. This was placed in a small olla with others of the same variety and, when sowing time came, a quantity was taken from the olla and planted without culling out individual seeds.

Teparies and Common Pink Beans

Time of Harvest

The Papago made only one planting of teparies—in July, and harvested in October. The Pima made two; their first planting, as mentioned earlier in this chapter, was made when mesquite began to leaf out, the second soon after sahuaro harvest. The first was mature in late June, the second in October.

Informants said if maize and teparies were planted at the same time the maize would be ready to harvest before the teparies, which required a minimum of ten weeks under favorable moisture conditions. They invariably matured

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of pods than do *frijoles* is reported by Freeman,[12] whose experiments showed teparies yielded 450 to 700 pounds per acre by dry farming, compared with 800 to 1500 pounds when grown under irrigation; also that under all conditions teparies outyielded *frijoles* often as much as four to one. There was no difference in the yield of different kinds of teparies.

Utilization

Dry teparies were customarily cooked by themselves and eaten, or cooked with roasted corn. Pink beans were not considered good unless cooked with meat, preferably fat, and, since this was not always available, their use was somewhat limited. Formerly, in times of food scarcity, women would go out into the field prior to the general harvest and gather such teparies as had already matured, but these were never cooked as green beans (i.e., both pods and seeds). *Frijoles* were usually gathered only when ripe, then dried and stored, but on occasions of need were picked in the pod before ripe, and boiled.

All Pimans seem to prefer the taste and quality of the white tepary to that of the brown. However, there is a great deal of variability among individuals as regards preference between teparies and pink beans. There is little difference in the nutritive value of the two, although the tepary markedly surpasses the latter in rate and degree of swelling and of absorptive power when soaked in water; also the seed coat of the pink bean is heavier than that of the tepary.

Anciently there was little use for tepary and pink bean vines, although if building a house a person might place some on the roof and cover with dirt. Hulls were never utilized. At present the vines and hulls serve as fodder for cattle and horses.

[12] Freeman, *Southwestern Beans and Teparies*.

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ripen before being picked. Of course, at present, with the commercial growing of cotton, Pima pick the cotton from the open bolls directly off the plants in the field.

Cotton seed was stored in sealed ollas in exactly the same manner as were teparies. There was no selection; seed for planting was simply taken from the general supply stored for food.

Utilization of Cotton

Cotton was grown for both lint and seeds. The lint was used for cordage, cloth, garments and tinder. Tinder was prepared from a cotton rope about one-half inch thick, several inches long and frayed at one end, used especially for lighting cigarettes. Sparks made by pounding two pieces of flint together ignited the fiber. Its use as tinder may be a Spanish introduction.

Cotton seed was parched and eaten much like we use pop corn. The seeds were placed in an olla with embers of mesquite wood on top. The olla was continually shaken and the live coals soon parched the seed. Another way of utilizing the seed was in combination with mesquite or cornmeal. Mesquite pods were pounded fine with a wooden mortar and pestle, seeds removed, and the flour mixed with that secured by pounding parched cotton seeds in a mortar. The two were then mixed and molded into a sort of cake-like tortilla, baked in ashes and eaten. A combination of cotton meal and cornmeal was utilized in the same way. Informants said either mixture tasted like, and had the texture of, tallow. From the pounded seeds Papago and Pima made a kind of bread which was baked in hot ashes. At times, water was added to pounded cottonseed meal, strained, and the liquid used as seasoning in cooking. The strained meal residue was sucked in order to remove the nutriment, and the pulp discarded.

Papago informants stated cotton was used ceremonially on their prayer sticks to symbolize clouds, and thereby invite rain. Pimas preferred eagle down for this purpose.

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person mounted on another horse, or at times afoot, drove the animals around and over the wheat continuously for seven or eight hours, thus trampling out the grain. One man kept the wheat raked evenly over the floor. Pi Pa 243

When the task of threshing had been completed, a certain amount of winnowing was done by throwing the straw into the air, formerly by hand, then with improvised forks, and later with steel ones. Women, on their hands and knees, used branches of creosote bush for brushing up, gathering and carrying the coarse straw from the floor. Formerly most of this was burned although a small amount of the straw was saved for making baskets, etc. Small amounts of wheat, too green to be included in the general threshing, were put to one side, allowed to dry further, and flailed later.

Winnowing and Storing

Women then gathered the remaining grain and chaff into shallow winnowing baskets, about three feet across, held them at arm's length in the air and allowed the contents to fall gradually to the ground, the wind meanwhile blowing away the chaff. The grain was then placed in cotton cloths (later in sacks) and carried to the house for further winnowing on some windy day by dropping it from shallow baskets on to sotol mats or cotton cloths. The wheat was finally dried on these mats in the sun for two or three days, remaining bits of straw picked out by hand, then stored in baskets three or four feet high, usually made of grass after the fashion described under the storing of maize. The average Papago family had a crop of about two bushels. Pi Pa 243 257

Utilization of Wheat

When flour was needed the grain was pounded in a wooden mortar with a stone pestle, after being softened with a little water. At present, the grain, before being ground into flour on the metate, is dried thoroughly in the sun, then shaken in a basket until the hulls are blown away. Pi Pa 252

Papago informants said often in earlier days food was

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scarce when May came around, and it was common to gather matured heads of wheat, beat out the grains and eat them before the general harvesting was begun.

Watermelons and Muskmelons

Time and Method of Harvest

The Pimans were very fond of watermelons, moderately so of muskmelons. The Pima usually made two plantings of both, the first ready for harvesting in late June. the second in October, although muskmelons were a little later in maturing than were watermelons. The single Papago planting ripened in October. Watermelons were tested for ripeness by their sound when thumped; also they were considered mature when the tendril on the stem of the melon dried and curled up. However, they often were eaten before completely ripe. Ripening of muskmelons was determined by their odor and resistance to pressure. Pima informants said when the first planting of watermelons had matured the fruit was picked, then the vines irrigated and in about six weeks there was a second, although smaller, crop.

Either men or women picked the melons when harvesting, and put them in a pile. A few melons at a time were placed on a mat or cotton cloth laid on the ground, and carried to the house or storage pit, this usually being done by the men.

Storage

The Pimans stored a goodly supply of watermelons for winter use, but did not bury them in sand as did the lower Colorado River tribes, although informants had heard of the Yuma and Maricopa doing so. Formerly they were stored in the oval pit with gable roof as described under "Storage of Pumpkins," but more recently Pimans have used a cubical underground pit about four feet in each dimension, slanting inward at the bottom on all sides and built on a hill if possible. Poles were placed on the bottom of the pit and covered with cornstalks, on which were placed alternate

5: Castetter & Bell N-5 (1938-1940) 1942
NU28 Papago NU28
Pima NU29

layers of wheat straw or bean vines, and watermelons. Sides of the pit were not lined. For a roof, poles were laid across the opening and a layer of arrowweed covered with dirt over all. Earth at one end of the pit was dug away to allow a vertical entrance about three feet high, which was covered with a framework of slender poles. Watermelons thus stored kept well for as much as three to four months. Informants said they kept better if a six-inch section of the vine was left attached to the fruit at the time of picking. Pi Pa 251

Watermelon and muskmelon seed for planting was always selected on the basis of size and quality of fruits, thus from the largest and sweetest specimens. Pi Pa [242]

Utilization

Fruits when ripe, particularly watermelons, were commonly eaten fresh in great quantities, although at times preserves were made from the rind by cooking without sweetening. Watermelons were never dried. Muskmelons did not store well so had to be eaten relatively soon after maturity, or dried for future use. Pi Pa [252]

The method for drying muskmelons was similar to that described for pumpkins, except that the melon was peeled and cut lengthwise, the soft pulp and seeds scraped away. Only thoroughly ripened fruits were used in this manner. The short straight strips were then dried on top of the house or *ramada* for several days, or until they could be worked well. A number of strips were placed side by side and tied into bundles, dried further on a shed, twisted into hanks and stored in baskets, or in ollas with a cloth over the contents, covered with a piece of broken olla, then sealed with mud. In spring they were eaten dry without boiling or preparation of any kind unless they had become quite hard, in which case they were boiled and eaten with pinole. At times the dried melon was toasted over a fire to soften, then eaten by alternately taking pieces of melon and drinking pinole. This practice is very rare today. Unlike pumpkins, such dried Pi Pa [264]

7: Lumholtz N-5 (1909-1910) 1912
NU28 Papago NU28

here also bees deposit their honey and bats make their homes. Sometimes rabbits attack the stem to get at the juicy pulp. 137

To the Indians the sahuaro is invaluable, and by tacit understanding they consider it a crime to cut one down. The grateful fruit comes at a time when most needed, and the Indians leave their habitations to camp among the sahuaro as long as the season lasts. Not only does the fruit then furnish them with their principal means of subsistence, but the greater part is boiled down to a sirup for future consumption in the winter, serving also as material for an intoxicating drink, which is used at the sahuaro festival. The seeds, too, are eaten after having first been ground on the metate, and they taste better than would be expected; the Indians also feed their fowls with them and many sackfuls are brought back to the houses after the sahuaro harvest. The wooden skeletons or ribs of the sahuaro furnish the Papago with light, strong, and elastic building stuff, and from the same material he makes the long stick which is needed to bring the fruit down from its lofty elevation, coloring the pole red with the juice of the fruit. Also chicken coops, chairs, traps, and similar articles of the household are manufactured from sahuaro ribs. Even the wooden tissue bags produced by the woodpeckers are made to serve as water bottles or drinking vessels. 222 [252] [273] [342] [322] [415]

So important a part does this cactus play in the life of the Papago that their year begins with the sahuaro harvest. The season lasts from the middle of June till the middle of July. Every rancheria is supposed to make [805] 222 796

7: Lumholtz N-5 (1909-1910)1912
NU28 Papago NU28

seemed able to live here. The prevalent vegetation was, as usual, greasewood with salt bushes now and then. Low sand dunes were visible here and there.

The Pimas of Kohatk I found to be good-tempered, affable people. The women cut their hair in front so as to have bangs and they are good-looking. These natives seem to be somewhat under Roman Catholic influence and have abandoned their native feasts. Photographing was as much detested here as elsewhere. The sight of my camera would make the children take to the woods and the old men hurriedly disappear on hands and knees into their dome-shaped huts.

I heard neither English nor Spanish spoken, but the inhabitants have adopted the frontier man's way of living, frying their meat in lard and adding quantities of it to their beans. They buy white flour and make unwholesome tortillas in boiling lard. This heavy, poorly cooked food forms their daily regime, without any variety. A small bucketful of coffee is distributed at meal-time both in the middle of the day and in the evening. They possess cattle but, like most white ranchers, are too lazy to milk the cows. The meals are appropriately served on plates of cheap crockery and cups bought in the white man's stores. The participants give audible evidence of consuming more lard than is good for them, and, were the facts known, "to be as dyspeptic as a civilized Indian" would be an adage. Think of the anomaly of leaving wholesome, natural, well-cooked dishes for a diet of lard and the cheapest kinds of canned goods.

Contrary to the universally accepted opinion, the cui-

7: Lumholtz N-5 (1909-1910) 1912
NU28 Papago NU28

sine of barbarous Indians is excellent. To be sure, they 252 ●
have few dishes, but there is variety enough, and an important fact is that the food is never "killed," *i. e.*, overcooked, as is the all too common habit of the poor white man; the food retains a natural, pronounced flavor of its own, unknown to most whites, besides having all the life-giving elements. After all, nothing tastes as well as the simple things, well cooked. What is better than the whole wheat cakes of the Papago Indians of Sonora? They are nature's genuine gift to hungry men, furnishing at the same time extreme satisfaction to one's sense of taste. I know of an American who came across this dish fit for kings in a corner of Sonora, to whom it was such a revelation that he ordered two sacks of the flour to be sent to his distant home. The primitive Indian way of cooking beans in clay vessels without lard is unsurpassed for preserving the inherent flavor of the bean. No one can cook squash as my modest Indian hostess or make an *atole blanco* (thin gruel of maize) like hers; even the Mexican women cannot compete with her in this. The green corn that is offered in early autumn in fashionable restaurants in New York as a native delicacy ought to bring a blush of shame to the chef's cheeks, watery and devoid of flavor as it is.

Apart from the stultifying process of jumping literally, as the saying goes, from the frying-pan into the 252 146
fire in their effort to imitate the white man, there is a very sad feature connected with the abandonment of native dishes. Indigestion and a one-sided diet undermine the strong constitution of the Indian, enfeeble his [164]

7: Lumholtz N-5 (1909-1910)1912
NU28 Papago NU28

252 146 [164] blood, and leave him with little power of resistance to his great scourge, tuberculosis. According to my interpreter, who is an observant man, it is no uncommon occurrence among the Papagoes who have adopted the white's man's cooking, even to die from indigestion. Next to brandy, lard is the greatest curse civilized man has brought to the Indian.

000 After a warm and cloudy night we had the somewhat rare experience of four hours of rain in the forenoon. Still, in the afternoon, as the rain had not been so very heavy, we decided to return to Kukómalik, thinking we might get there in an hour and a half by driving a little fast. We made our way very well up to about a mile within our destination, when our horses began to encounter difficulties. The land here was slightly depressed and therefore retained the newly fallen rain as a reservoir on its alluvial soil. The ground became very soft, and finally, in spite of heroic efforts, our horses could pull no more. The night had overtaken us with darkness, deep as in Egypt of old. Pablo went to look for a team to pull us out, while I remained behind trying to light a candle which the insects aggressively put out. At ten o'clock the moon rose and made the outlook a little bit more cheerful.

A fresh team of Indian horses after a while came splashing through the water, but they proved inadequate for the task, and we had to camp where we were. The mud was of the kind of which adobe is made and stuck to our shoes like clay, but there was no necessity for walking around much. There were a few mezquite

7: Lumholtz N-5 (1909-1910) 1912
NU28 Papago NU28
Sand Papago

which the Indians knew how to gather all the year round, though after May that part of the plant which is above ground withers away. They had their season of chia and used to come as far as Quitovaquita and Santo Domingo to gather mezquite beans (called by the Mexicans *pechita*) and eat sahuaro and pitahaya. Near all the tinajas are seen round holes from six to ten inches deep, made into the solid rock, in which these Indians pounded mezquite beans. Their pestles are frequently found. The beans of the palo fierro were toasted, ground, and consumed as pinole. After the scanty winter rains the juicy plant of the sand dunes, *œnothera trichocalyx*, was boiled and eaten.

The clothing of these people was made from the skin of mule-deer, antelope, or mountain-sheep. The hair was first removed with a bone taken from the lower foreleg of the animal, and the skin was smeared with the brains. The root of the torote tree, crushed and left in water, furnished necessary material for the tanning process. The man wore shirt and breech cloth, the woman a short skirt. They killed sea lions on the rocks by hitting them on the nose, and from their skins sandals and straps were cut. From the badger's hair they were able to plait ribbons for the hair and make twine to be used for the breech cloth. Women wore sandals, but no hair ribbons. The skirt was kept up by strings of buckskin.

The burden basket was not used, but they made carrying nets as well as pottery, material for which is abundant on the coast. Baskets were manufactured from torote, willow, and bulrushes. In order to make bows, these Indians travelled as far as the Colorado River to get

8: Pijoan, Elkin & Eslinger D-5 (ca. 1942)1943
NU28 Papago NU28

pepo; Cucurbita moschata), dried chili (Capsicum annuum), a native spinach or pigweed (Ameranthus Palmeri), and whole wheat and peeled wheat (Tricitum vulgare). The majority of these foods are dried for storage.

The Papagos utilize for consumption the available varieties of cactus as they did aboriginally, gathering the fruits of the cholla (Opuntia echinocarpa) and various other kinds of prickly pear (Opuntia spp.) and the sahuaro (Carnegiea gigantea). The fruits are eaten in large quantities during season and in most instances these are baked for 24 hours in pits partially filled with hot stones; the surplus is dried for storage. The sahuaro fruit is often prepared as a syrup or jam. The seeds of the cactus are dried and later these are ground into a meal from which they prepare a gruel. In most of their cooking the Papagos use quantities of fat, especially lard or vegetable shortening.

In general it can be said that the diet of these people is one rich in cooked carbohydrate, with occasional animal protein and, in rare instances, cooked green fruits or vegetables. The Papagos drink but little milk (except from the breast during infancy); most of the natives in the outlying districts drink no dairy milk at all. As a result of their diet numerous avitaminoses occur, superimposed one on the other; the deficiencies may be subclinical or threshold in character due to a continued shortage of vitamins in the diet.

ASCORBIC ACID STUDIES

Various studies in the literature indicate that the ascorbic acid content of the plasma and the amount excreted are an index of the previous dietary intake (Belser, Hauck and Storvick, '39; Heinemann, '38). On the other hand, reports have appeared where the blood analyses themselves are used to determine the actual state of ascorbic acid nutrition (Minot, Dodd, Keller and Frank, '40). In some instances the blood and urine analyses have been supplemented by the determination of ascorbic acid in the dietary intake (Todhunter and Robbins, '40; Goldsmith, Ogaard and Gowe, '41). However, as Bessey and White ('42) have pointed out, the practical problem is one

11: Hoover U-4, 5 (ca. 1930) 1935
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coyotes, and decayed vegetables.[14] Settled again from Tecolote, Poso Verde, situated in a semicircle of foot hills, is now one of the most pleasing of all the Papago villages.

The "trincheras" or walled fortifications on the isolated mesa four miles east of San Miguel were built by the Papago as a retreat in case of Apache raids. They are in this respect distinct from the prehistoric trincheras on the mount just south of Sells, near Poso Verde, and through the Altar Valley, described by Sauer and Brand.[15]

The most important factor in making new and smaller settlements desirable has been the introduction of cattle, dating from the journeys of Father Estubio Kino, 1691–1702, followed by those of Father Garcés, 1768–1775. Along with Christianity, Father Kino introduced cattle, horses, and chickens. Cattle did not become important with the Papago, however, until the latter part of the nineteenth century, and the extensive areas between their limited fields were of little use to them except as game preserves. By hunting and gathering in these areas, they supplemented the produce of their fields, but no inducement was offered to permanent settlement of these areas. In 1849–1850 John Audobon described the Papago as fast passing away, judging from the dilapidation of the towns and the number of empty houses.

> The people live on turtles and what game they can get. I have seen small elk and antelope skins dressed and terrapin shells are everywhere. We have bought two terrapins fresh killed, some roots, and the fruit of a plant called the manguey.
>
> Why it is that these Indians settle in such a country, I cannot conceive, for even the lizards, in most places innumerable, are scarce here. The Indians kill them with a light wand, giving them a dextrous tap on the head. They pick up the game, slip the head under a belt or string round their waists, and when sufficient are collected, a little fire is made, and this delicate repast is enjoyed by them as an epicure would relish his brace of woodcock.[16]

Audobon also described a sort of mush made of grasshoppers. The insects were caught and dried, then pounded and mixed with meal or pinole, parched wheat or corn, spiced and pounded.

Pastoralism is better suited to a scattered population, so the tendency has been for the larger villages to break up into more scattered settlements. The passing of the old Tecolote village in favor of smaller communi-

[14] J. Ross Browne, Adventures in the Apache Country (New York, 1874), p. 277.

[15] Carl Sauer and Donald Brand, Prehistoric Settlements of Sonora, with Special Reference to Cerros de Trincheras (University of California Publications in Geography, Vol. 5, No. 3, 1931), espc. pp. 67–70.

[16] Audobon's Western Journal, 1849–50 (Cleveland, 1906), pp. 148–50.

17:Castetter & Underhill N,E-5 (1931-1934) 1935
NU28 Papago NU28

252 412 415 Cooking was done in a small roofless enclosure outside. There the woman kept her mealing slab—a rectangular block of granite hacked into shape with another stone. She had a mortar made of a section of cottonwood log, a large porous jar for drinking water, and a few smaller pots for cooking. Most of her utensils were baskets, for this migratory people found pottery a burden. There were large willow baskets for storage, others for winnowing, for parching seeds, and for eating and drinking. Willow baskets, tightly woven and water-tight when wet, took the place of dishes. Some households owned no pottery except the water-jar.

291 302 Clothing, in the older times, was of skins, the man wearing a breechcloth of buckskin, the woman a buckskin skirt, while those who could trade for cotton had a one-piece, wrap-around cotton skirt. Both sexes wore their hair long but tied it up with a strand of grass while at work. For warmth they often covered their bodies with grease, and on ceremonial occasions added to the grease [304] red and white paint. Women were tattooed with four lines from mouth to chin, in zigzags, dots, or merely straight lines.

291 The Papagos were a sandal-wearing people. For long journeys they made sandals, first of basketry materials and later of cowhide, but while at home they went barefoot. Occasionally we hear of the rabbit skin blanket which was so long known among their neighbors both of Arizona and California.

442 Papago women, busy with basketry, pottery, and the gathering of wild foods, did little work at agriculture, so the men took care of the fields and did the hunting. They also had to make frequent war expeditions to pursue marauding Apaches who raided their villages to take away crops, women, and later cattle and horses. Men also made trading expeditions to the Pimas and into Mexico. As a 525 means of acquiring wealth in these primitive times gam- 556 bling should not be overlooked, for success in the ancient

17:Castetter & Underhill N.E-5 (1931-1934) 1935
NU28 Papago NU28

UNCULTIVATED PLANTS USED AS SOURCES OF FOODS, BEVERAGES, SMOKING, AND CHEWING MATERIALS

1. Foods

The Papagos, like other peoples in the area, exploited 222. the vegetable resources of the desert to the utmost, and the same plant at different seasons would provide not only roots, greens or fruits for food, but twigs for basketry, wood for implements or sap for dye.

In years when the rainy season was late they lived entirely on wild foods without planting at all. When the foods ripened, during or after the rainy season, enough was gathered and stored to last throughout the year, but just before the giant cactus harvest, food became very scarce, [805] as is indicated by one of their names for May, *ko'ohk macat*, "the painful moon."

Some foods like the hackberry were simply used by 252 the people in the neighborhood, while others like agave 222 and acorns were gathered by special parties and either 488 utilized or traded. There was one island of unusual flora on Elder Brother's mountain, Baboquivari. Here, near a permanent stream, grew the special luxuries he had provided for his people, and parties went to pick them for trade or on behalf of a village. Certain staples, however, grew in great quantity and these were gathered by everybody.

Different parts of the territory used different magical 341 practices to insure a good crop, the most common being to 232. make effigies of the desired fruits and plant them in the 789 gathering grounds after a night of ritual singing. Sometimes merely an ironwood stake *(Olneya tesota)* was planted [824] instead of the effigy.

When a crop was reported ripe the village organized 222 its food gathering expedition. If the expedition were for

17:Castetter & Underhill N,E-5 (1931-1934) 1935
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The small succulent plants used as greens grow near the villages and can usually be gathered within a day's excursion. One informant said: "In the afternoon, my mother-in-law would say to us, 'let us go out and gather amaranth.' So I and my sisters-in-law would take our carrying nets, walk about half a mile from the camp and fill them. Then we made soup and that was all we had for supper" (the main meal). This and the other small greens mentioned are never dried and stored but, as with other fresh crops, the family lives on them almost exclusively while they last. The branches of the saltbush *(Atriplex wrightii)* are used for seasoning either in cooking or in pit-baking.

The buds and joints of the five species of Opuntia mentioned constitute a staple crop, probably because they grow so plentifully, and *O. echinocarpa* is found in abundance on the nearby hillsides.

The branches of the chollas are composed of easily detachable joints; the flower buds which develop at the tips of the branches are gathered as they come out in May. Whole cholla joints, as well as the buds, are pit-baked and dried. Women go out in parties to gather the crop, this being done with wooden tongs made of a length of giant cactus rib *(Carnegia gigantea)*, split in two. The buds or joints are collected in coiled basket bowls and brought to a central point where an old woman directs the baking. When the picking is ended, a pit is dug, stones placed in it and heated with a mesquite fire *(Prosopis velutina)*, since creosote bush *(Covillea glutinosa)* burns up too quickly. When the stones are hot they are removed and the pit lined with ink weed *(Dondia nigra)* or with grass. Next a layer of buds or joints is placed in the pit, then hot stones, then the pit filled with alternate layers of ink weed or grass and buds and covered with earth. They camp all night while the product is baking, and roast in the campfire ashes that portion of the product which has been reserved for their evening meal. The women carry home the roasted cholla

17;Castetter & Underhill N,E-5 (1931-1934) 1935
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251 and continue to go out for other batches until a large area surrounding the village has been picked over. The roasted 252 buds are used with greens of the annual salt bush *(Atriplex wrightii)* or lambsquarter *(Chenopodium alba)* as a sort of vegetable stew.

222 Although all Papagos eat mescal *(Agave americana)*, 251 many of them get it by trade rather than at first hand. It [438] grows on the hills along the present international border and is usually gathered by parties who go to Sonora to work during their winter wanderings, stopping for a week or two to pluck and bake the mescal, and when necessary storing it in pits until they are ready to carry it home.

[412] Digging sticks of any hard wood, made chisel-shaped by pounding with a stone and hardened in the fire, are used to hack the plants off at the ground. The spiny leaves are then chopped off with a mescal hatchet, a semi-circular stone blade of granite or diorite.

251 The agave is pit-baked for twelve or more hours in the same way as are the cholla buds and joints. When this is done the remains of the leaves are pulled off, leaving an inner succulent mass about the size of a cauliflower. This has a slimy consistency and a sweet taste which is highly regarded. It is kept in jars to be eaten a little at a time or traded as a delicacy.

222 The flower stalks of the American aloe *(Agave americana)*, of sotol *(Dasylirion wheeleri)*, and the shoots of the night-blooming cereus *(Cereus greggii)* are also eaten as greens. They are not very extensively utilized however. [285] Sotol is also a source of basketry material, but if the inner tender leaves have been taken for this purpose, the flower stalk does not develop. The flower stalks are dug out of the plants with a long stick having a chisel-like end, and cooked immediately but never stored.

252 An upright species of prickly pear cactus *(Opuntia* 222 sp.) is utilized by washing the large waxy flowers to remove their sticky secretion then frying them in grease, formerly deer fat, now lard.

17:Castetter & Underhill N.E-5 (1931-1934) 1935
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Another occasional food, or more accurately a drink, is the pulp of the *viznaga*, barrel or niggerhead cactus *(Echinocactus wislizeni)*. If one becomes thirsty on a journey he cuts the top off a plant with a sharp stone, pounds the pulp and scoops out the juice with the half gourd *(Lagenaria vulgaris)* which he carries as a drinking and eating vessel.

According to Thackery and Leding (25), the fruits of the viznaga are cut up and cooked with cornmeal or other material, the seeds being discarded.

Root, Tuber, and Bulk Crops

Sand-root, *caa't* *(Ammobroma sonorae)* October
Wild potato, *taiaroti*. A climbing species of *Solanum*. Summer
***mo'otari* *(Franseria tenuifolia)* Summer**
Wild onion, *sipuia* (Span.) *(Allium unifolium)* May
Papago Blue Bells, Covena, *ha'at* *(Brodiaea capitata* var. *pauciflora)* April
Night-blooming cereus, *ho'o'k iva* *(Cereus greggii)*

The staple root crops are the sand-root *(Ammobroma sonorae)* and the root of *Franseria tenuifolia*, both of which appear on the flood plains near the villages after the rains. Whole families go out with digging sticks usually in October to gather the roots of these species, and live upon them while they last. Any surplus is sun-dried on the house-roofs and stored in jars.

The sand-root has been used from time immemorial by the Papago and is parasitic upon the roots of the small desert shrubs *Coldenia plicata* and *C. Palmeri*, as well as on *Eriogonum deserticolum*. It is to be found in parts of the Southwest where the average rainfall is between only two and five inches, and is eagerly sought by the Papagos, who consider it a most excellent food; it is eaten either raw or roasted (6, 17, 24).

Palmer (20) records that these people dried and ground the stems of the sand-root with mesquite beans *(Prosopis*

velutina) to make a pinole,[1] and discusses its general use and preparation, while Havard (14) also refers to its use by the Papago.

Similarly the tubers of the climbing potato (a species of *Solanum*) and the roots of the wild onion *(Allium unifolium)* which grow only on Mt. Baboquivari, were collected in May and mid-summer, respectively. These two plants were brought back by hunters, or by individuals who made the long special journey to obtain them to trade for baskets, skins or pottery. The bulbs of Papago Blue Bells are eaten raw. They do not have a pleasing taste and are eaten largely because they appear in early spring, before other crops are ready.

The large root of the night-blooming Cereus *(Cereus greggii)* which may weigh as much as four pounds is chewed raw for thirst or may be baked whole in ashes, peeled and eaten.

Fruits[2]

Small fruits:

u:spa't (Condolia spathulata) Summer
Mulberry, *kohi (Morus microphylla)* Summer
Hackberry, *kom (Celtis reticulata)* Summer
Boxthorn, *kuawur (Lycium fremontii)* August
Mistletoe, *hakowa't (Phoradendron californicum)* Summer
Lote bush, *u:s teui'tpa't (Zizyphus lycioides)* Summer
Bird Cayenne pepper, *tcirtipin (Capsicum frutescens* var. *baccatum)* August
Black oak, *toa (Quercus emoryi*, also *Quercus oblongifolia)* July
Buckmut, coffee berry, quinine plant, *kohwi (Simmondsia californica)* August

Cactus and Yucca fruits:

Giant cactus, sahuaro, *ha:canyi (Carnegia gigantea)* July
Organ pipe cactus, pitahaya, *tcutcuis (Lemaireocereus thurberi)* August

1. The Papagos mean, by pinole, a gruel made of parched, ground cornmeal and water. Since the meal has been parched before the water is added, no cooking is necessary. Pinole was the only ration used on journeys, since it served both for food and drink. It was also the prescribed food during ceremonial purification.

2. The term fruit is here used in the botanical sense and thus covers berries, nuts, etc.

17:Castetter & Underhill N, E-5 (1931-1934) 1935
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Prickly pear cactus, *nohwi (Opuntia engelmannii)* June, October 216.2
Cholla *(Opuntia fulgida)* August 222
Cholla, *tci'orim (Opuntia echinocarpa)* August
Soapweed, datil, *hoi (Yucca baccata)* (fruit *howitc*) Summer

Of the small fruits, *Condolis spathulata* is eaten only 222
raw and not thought worth preserving. If hackberries 251
(Celtis reticulata) or mulberries *(Morus microphylla)* are found near the village, carrying baskets are filled with whole branches of them by the women. Clusters of mistletoe *(Phoradendron californicum)*, which often grows on the mesquite bush *(Prosopis velutina)*, are gathered, their branches laid on mats, dried and the berries rolled free. These berries form a sticky mass which is further sun-dried and stored. The somewhat larger boxthorn berries *(Lycium fremontii)* are picked, dried and eaten like raisins. Only the fruit of the lote bush *(Zizyphus lycioides)* is cooked, and this is boiled to a syrup like the cactus fruits.

These people now use as seasoning the very pungent 263
bird Cayenne pepper or spur pepper *(Capsicum frutescens* var. *baccatum)* which grows in the Baboquivari Mountains and apparently nowhere else in the state. This plant may have been introduced by the Papagos and is very much used by them in their daily life as a condiment on the table or for cooking with beans or other foods. It is this species that is cultivated farther south for the hot peppers. As one drives over the Papago Reservation and [438]
stops at trading posts he invariably finds dishes of these small, dry, red, extremely pungent berries offered for sale. These always find ready buyers among the Papagos and Mexicans.

Acorns *(Quercus emoryi)* ripen in July a little later 222
than the giant cactus fruit, but grow in only a few hilly places, mostly at the south of the Papago territory, and are gathered on a long camping excursion similar to that for the sahuaro fruit. For the most part acorns are eaten [432]
fresh from the shell. Bucknuts *(Simmondsia californica)* are similarly eaten though not in quantity. Russell (22)

17:Castetter & Underhill N, E-5 (1931-1934) 1935
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The fruit, if fully ripe, splits open when it hits the ground; if not, the woman twists off the fruit stalk which bears a hard circular calyx with sharp edges and with this she splits the fruit. In either case she scoops out the pulp from each half with two motions of her thumb and throws it into her basket, while the thorny shell she throws on the ground, taking care that its red lining falls uppermost, for this hastens the rain.

After each round the women pour the newly gathered pulp, of a deep crimson color, into a water-tight basket and soak it to remove the black seeds, which will later be used for flour. Since it shrivels within a few hours if left in the sun, they cook their harvest daily, usually at midday which is too hot for pulp gathering. The mother or mother-in-law officiates on this important occasion. She drains the water from the pulp, some of which has been soaking since the night before, breaks up the masses, shakes out as many seeds as possible, washes and dries these on a mat in the sun, and places them in a jar. The pulp, with double the quantity of water, is brought to a boil in a clay pot, then removed from the fire and placed in a straining basket. The liquid drained off is placed on the fire and boiled to a syrup, this being set aside from day to day. When the whole quantity is at hand it is sealed in a jar made air-tight by cementing a potsherd over its mouth with adobe mixed with fine grass or a transparent yellowish-brown "gum" gathered from the *samo prieto (Coursetia glandulosa)* upon which it is produced by a scale insect *(Tachardiella fulgens)* (25). This is the liquid from which the ceremonial drink *navai't* is made and each family keeps its supply to be fermented at the time of the general ceremony (see also Densmore, 9).

When the juice has been drained off as described above there remain the pulp and the seeds which can also be utilized. All households make cactus jam, the most important sweet in their diet, and for this only a portion of the juice is drained off. The remaining moist pulp is boiled to a sweet, sticky mass, looking much like raspberry jam.

17:Castetter & Underhill N.E-5 (1931-1934) 1935
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If the liquid be drained off completely there remains a dry mass of fiber and seed which is further dessicated on the housetop. It is then beaten with a stick to separate the seeds and these are parched and stored; they may be used to make meal cake or as chicken feed. One final product from the giant cactus is oil, which can be extracted from the seeds by parching them, grinding and adding water, after which a small quantity of oil comes to the surface. The pulp, instead of being disposed of as described above, may be sun-dried, stored, and cooked up as needed to make syrup, or it may be eaten dry or after being moistened with water (25).

The smaller fruit of the organ pipe cactus or pitahaya *(Lemaireocereus thurberi)* is as highly prized as that of the giant cactus and may be treated in the same way. It is less common, however, and grows only in the southern part of Papagueria and in parts of modern Sonora. It fruits twice a year and its many low branches are so plentifully covered that the Papago name for Milky Way is "the second harvest of Pitahaya."

The word *pitahaya* was used rather loosely by the Spaniards as a name for several of the tall cacti of Spanish America, together with their fruits including the sahuaro *(Carnegia gigantea)*. Perhaps the earliest reference to the pitahaya is one quoted by Bancroft (1) who states that Juan de Oñate, conqueror and governor of New Mexico, while on an exploratory journey westward from his headquarters on the Rio Grande in 1604, reported that he at length came to a country where the "tierra caliente began to produce the pitahaya." Padre Kino (3), the Jesuit friar, whose explorations from 1687 to 1710 covered southern Arizona as far west as the Colorado River, recorded in his memoirs the use of cactus fruits by the Indians of that region.

The Papago distinguish two kinds of edible prickly pears *(Opuntia* sp.), one of which produces chills and nausea in susceptible people. Groups of women pluck the

17:Castetter & Underhill N,E-5 (1931-1934) 1935
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fruits with tongs, pile them on the ground and brush them vigorously with creosote bush branches *(Covillea glutinosa)* to remove the spines, then carry them home and use them as an adjunct to a meal. The usual method of utilizing the fruit is to eat it fresh in large quantities while the supply lasts, unused fruit being dried or made into syrup. To dry it they scoop out the pulp and remove the large, hard seeds with the fingers, then spread grass on the ground and sun-dry the pulp on it for two days, after which it can be stored in a sealed jar. To make syrup they mash the pulp in a basket with a stick, squeeze out the juice and strain it twice; it is then boiled and again strained.

The fruits of the two chollas *(Opuntia fulgida* and *O. echinocarpa)* ripen in late summer, and are handled in the same manner as the buds, that is, gathered, pit-baked and carried home (25).

Similarly the datil fruit *(Yucca baccata)* constitutes an important staple crop which is gathered and preserved. As much as possible of the banana-shaped, sweet, pulpy fruit is eaten fresh and some carried home for that purpose. A gruel is also made from the fresh fruit. The seeds are removed by hand and the pulp ground on the metate, some cornmeal being rubbed on the metate and muller to prevent sticking. The pulp is then cooked with cornmeal and the seeds are dried.

In preserving the fruit two methods are employed. One is to open the fruit in the field and remove the seeds and fiber, these being taken home in sacks to dry. In drying they are spread on racks of sahuaro ribs *(Carnegia gigantea)* in the storehouse, and when perfectly dry are beaten on a mat to remove the fiber. The released seeds form hard lumps which are stored in baskets and ground into meal when needed. The other method is to dry the pulp in the field. Women scrape it out with the fingers, pat it into cakes and dry these on a hot stone. This drying is not sufficient for storage so the cakes are taken home and spread on the roof, and when thoroughly dry are stored in a jar.

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embers and shaken constantly to prevent burning. Or they are placed on a piece of broken pottery jar directly over the coals and the seeds stirred with a stick; after parching they are spread on the house roof for thorough dehydration before being stored.

Mesquite beans *(Prosopis velutina)* ripen in August near the summer villages and formerly constituted an important crop. The pod, which was much prized, has a sweetish taste and could be eaten fresh.

These beans could be either ground up like other seeds as flour, or the bean and pod could be pounded into a pulpy mass in a mortar, since they were too sticky for the metate. The resulting pulp was boiled. Beans were dried in the pod if they were picked near home, as the bulk was not too much to carry. In that event they were spread on the house roof and turned until thoroughly dried, then put away in a jar. If bulk needed to be reduced the sun-dried pods were flailed to beat out the seeds, the whole then winnowed in a basket and the seeds parched and stored.

The other legumes, ironwood *(Olneya tesota)* and palo verde *(Parkinsonia microphylla* and *P. aculeata)* produce beans which were flailed, winnowed, and parched in the same way as that described for mesquite.[4] The seeds of the devil's claw *(Martynia fragrans)* are also boiled and eaten.

2. BEVERAGES

Sahuaro, giant cactus, *ha:canyi (Carnegia gigantea)* juice fermented
Pitahaya, organ pipe cactus, *tcutcuis (Lemaireocereus thurberi)* juice fermented
Prickly pear cactus, *nohwi (Opuntia engelmannii)* ---juice fermented
Lote bush, *u:s tcui'tpa't (Zizyphus lycioides)* -------juice fermented
Jimson weed, thorn apple, *kotata'p (Datura meteloides)* root ground and infused
Tansy mustard, *cu'uwa't (Sophia pinnata)*----------made into tea
Sage *(Salvia columbaria)* ----------made into tea
Broomweed *(Baccharis sarothroides)* ----------made into tea
Joint Fir *(Ephedra nevadensis)* ----------made into tea

4. The chemical composition of the beans of *Parkinsonia aculeata* has been investigated by Robert A. Greene, Bot. Gaz. 94:411-415, 1933. He has found the composition of the whole bean to be similar to that of alfalfa hay or mesquite beans.

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Tobacco was planted in March and the planter would choose a place at the mouth of a small wash, out of sight of all the other fields, for tobacco had to be grown in secret. As soon as the plants were up creosote bush branches *(Covillea glutinosa)* were stuck in the ground to shade them. No one but the planter must now visit the patch or the plants would become shy and sink into the earth again. If a menstruating woman were to see them they would shrivel up and die.

No hoeing or transplanting was done but merely earth heaped around the roots now and then. A fence of mesquite posts *(Prosopis veluntina)* with thorny cholla cactus *(Opuntia* sp.) between protected them from marauding animals, and a ditch dug from the wash to the patch conducted any possible rain water. The creosote bush shelter was left until the plants grew up and touched it. When the tobacco was ripe the leaves were pinched off and spread on a mat outside the house to dry, although they were considered ready for smoking when about half dried, still green and very bitter.

COTTON

Cotton, *to'ki* *(Gossypium* sp.)

The early Spanish accounts refer to cotton as being grown, not only by the Gila Pimas (10), but by the Sobaipuris on the San Pedro (27) and by the people of San Xavier (10) (who were not the present residents). Little mention is made of the growing of cotton by the desert people, but informants thought a little was grown in favored places. No particulars of its culture were obtained. Cottonseed flour made very good browned cakes when baked on hot sand.

WHEAT

Wheat, *pi:rkanyi* *(Triticum aestivum)*

Wheat seeds were given away profusely by Kino at the end of the seventeenth century. Most Papagos, however, say they did not take over its general use until two or three

17:Castetter & Underhill N,E-5 (1931-1934) 1935
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243 generations ago, when they learned more about it in Mexico. Many old people knew no flour in their youth, save that from wild seeds. One reason for this may be that until government wells were dug in the flats they were not able to live there in the cool weather when wheat should be planted.

At present most families raise enough wheat for their own use, planting in February and harvesting in May. After the field is plowed, wheat is planted by hand and the ground then harrowed. Occasionally the planter mixes his seed wheat with ashes and scatters the two together (7). The method of harvesting is that used in Spain in the seventeenth century, and consists in cutting the wheat with a scythe or sickle, then threshing it on a threshing floor—a circular patch of hardened ground, belonging to the patriarchal family in common.

When wheat is to be threshed three horses are hitched abreast, the inner one tethered by a long rope to the pole, and are driven round and round to trample the grain. One man walks behind and drives them, while one keeps the wheat stalks raked evenly over the threshing floor.

For winnowing the people wait for a windy day, then place the grain in large winnowing baskets about three feet
251 across and toss them until the chaff is blown away. Wheat is stored in grass granaries three or four feet high and about four feet in diameter (7). When flour is needed the
[252] grains are softened with water and pounded in a mortar with a stone pestle. The grain is now dried on the roof in the sun and then shaken in baskets until the hulls are blown away. Most of the wheat used by the Papagos is ground with the metate and mano, although some of it is now ground on the grinding mill.

243 The Papagos cultivate chiefly Sonora wheat *(Triticum aestivum)* which is very drought resistant. They use it for making their native breads, but it does not make a good leavened bread on account of is low percentage and poor

FOOD PREPARATION

The Papago diet consisted ordinarily of dried foods: 262
cereals, dehydrated vegetables, and sun-dried meat. Fresh foods were available for only short periods, when they were consumed in quantity.

The year round staple was flour, made from corn; the 252
beans of mesquite *(Prosopis velutina)*, ironwood *(Olneya tesota)*, or palo verde *(Parkinsonia microphylla)*; pumpkin seeds *(Cucurbita pepo)*, dried yucca fruits *(Yucca* sp.*)*, sahuaro *(Carnegia gigantea)* and various other wild seeds. The technique with all these except the sticky mesquite was to parch, sun-dry, and store in sealed jars. The parching was done at the time of gathering and was really part of the storage technique to prevent mildew, although the seeds were not ground into flour until just before they were used. The mesquite beans, too sticky for a metate, were pounded in a mortar made either of stone or wood (a mesquite log hollowed with a stone axe). Women who went to gather the fruit of the Spanish Bayonet *(Yucca elata)* often pounded it to a pulp in hollows of the rocks.

Flour was used most often in the form of a gruel. 272
There were two kinds: *waka*, the Mexican pinole, which served warriors and people on journeys with both food and drink, was made by simply mixing parched corn flour with water. *Ator*, the gruel served at home on non-ceremonial occasions, was made by boiling the flour with water and salt. The pot in which it was cooked was rarely empty, and for a meal a little more flour of any kind was added, and the whole cooked. Thus all sorts of combinations were possible, the favorite being cornmeal with sahuaro seed flour *(Carnegia gigantea)*, which was slightly oily and sweet.

Mesquite flour, unlike other flours, was made at the 252
time the beans were harvested. The housewife ground parched seeds and made the flour into a compact cake. This was sprinkled frequently with water for several days until

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252 it hardened into a lump, called the "mesquite turtle," and pieces could be broken off and eaten just as they were.

Breadstuffs were used much less often than gruel. The most common was the tortilla made of cornmeal and water. Flattened balls of this dough were quickly cooked on a heated pottery griddle; or they might be baked in the ashes of the hearth, thus making a sort of ash bread. Among the Papagos of Sonora, however, wheat flour tortillas were and still are dominant. Cottonseed flour *(Gossypium* sp.) and sahuaro seed flour which are oily, made very good browned cakes when baked on sand heated under hot stones.

262 Gruel or bread was the basis of every meal and the
264 usual addition was boiled dehydrated vegetables. All greens
262 like aloe *(Agave americana)* and cholla joints *(Opuntia* sp.) had been pit-baked before storing, while root crops and the cultivated squash and beans had been simply sun-dried. All of these were taken from the storage jars and soaked both to freshen them and to remove dirt, then boiled with water and salt. A favorite dish was a form of succotash, made of dried teparies and corn grains.

252 Fresh greens like amaranth *(Amaranthus palmeri)*
262 and fresh squash were also boiled, but, since water was scarce, anything that was juicy enough was roasted. This was the treatment for the flower stalks of aloe and sotol *(Dasylirion wheeleri)*, the joints of cholla, cañaigre greens *(Rumex hymenosepalus)*, and squash. Ashes were raked out of the fire and the vegetables buried in them. In a period of marked water shortage dehydrated vegetables also could be treated in this way after the first soaking.

263 The sweets, highly prized, were dried fruits, fruit jam, fruit syrup, and honey. Sahuaro *(Carnegia gigantea)*, pitahaya *(Lemaireocereus thurberi)*, and prickly pear *(Opuntia* sp.) fruits could be dried and stored in jars, but not for long because they became wormy. Syrup and jam from all these fruits were made when they were picked. The flowers of mesquite *(Prosopis velutina)*, ironwood *(Olneya tesota)*, and species of yucca have a good deal of nectar. These

17:Castetter & Underhill N.E-5 (1931-1934) 1935
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plants bloom just before the rainy season so that during the 243
summer honey was plentiful. As a confection people sometimes chewed acorns *(Quercus emoryi)* and squash seeds.

The meat of large game was usually cut into thin strips 252
and sun-dried by the hunters on the spot, although in cold weather a man might bring home his kill and eat some of it fresh, then cut up and dry any remainder. These dried strips, which at best did not keep long, were hung from the roof, and when needed were pounded soft with a stone and boiled.

Fresh meat could be either grilled or boiled. For grilling, venison was cut in strips, rabbits were skinned, since the skin was useful, and birds were roughly plucked. Birds and rats could be roasted in the ashes but the skin was left on for protection. Or, meat was boiled in a jar directly over the fire. Wild pepper *(Capsicum frutescens* var. *baccatum)*, added to the meat was a great delicacy. [263] A favorite dish was a stew of rabbit and various roots. The desert tortoise *(Gopherus agassizii)* was always ash-roasted, after cracking the shell with a stone, pulling out the entrails and inserting hot pebbles.

The worms used were gathered by women who pinched off their heads and squeezed out the entrails, leaving the outer portion which was lengthened in the process to a narrow string six inches long. They braided these strings, put the braids in carrying nets and went back for more.

The fresh worms, fried on the tortilla sheet in their 251
own fat, made a feast in which everyone indulged while they 252
lasted. The surplus was dried and stored but kept better if pit-baked before drying. One informant said "they were the best tasting food we had."

19: Dobyns E-5 (1950) 1951 NU28 Papago NU28

[Arizona Labor Camps]

751
825 In visiting labor camps in the course of this study, the writer saw Papago babies lying on the ground on a blanket in the shade of a camp cabin with flies in [854] clusters at their eyes and nostrils while the mother went about her work. Papago women were seen cooking [252] with flies buzzing freely around, and the daily pot of frijoles often sat on a spotless oilcloth table [264] cover with flies zooming in through an open door to the feast.

751/ In fact, in the heat of late Arizona summer and
362 early fall--the serious fly season--the doors of labor
825 camp cabins are closed only when no one is in the cabin. Every breath of air is precious in the oppressive heat. This is true among the Desert People even when they live in excellent concrete block cabins with spacious screened windows and screen doors. They seem to hold a somewhat Steinish concept that a door is a door is a door is a door, whether wood or screen, and they prop open a screen door to let in air just as they would a wooden door.

[659] This all points to the big job the Indian Bureau school and medical service still must do in educating Papago mothers and children to the dangers of the ordinary housefly.

That lack of cabin screening, and Papago lack of knowledge of its necessity is really serious in the labor camps is convincingly shown by other sanitary conditions--or their lack--in these rural slum towns.

TOILET FACILITIES

514
[466] Whatever the construction of houses in their camps, Pima and Pinal county labor camp operators provide very much the same kind of toilet facilities. In fact, they are almost unanimous in digging a pit and erecting over it the unpainted, rustic outhouse of folklore. Over 95% of the camps in the area exhibit outhouses as alike as boards sawed from the same log.[1] A few long established farmers making a life-time career of their land provided plumbing for their laborers--significant chiefly for proving that it can be done.[2] They had small cotton plantings and hired few pickers.

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[1] Based on: 20 of 21 camps in Pinal county and 22 of 23 in Pima, or 95%.

[2] Basis: 1 of 21 in Pinal and 1 of 23 in Pima county, 4%.

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[Arizona Labor Camps]

365 ←
415
252
291
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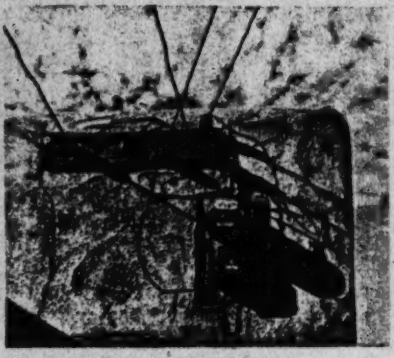

Some camps had electricity...

and cooking was easier.

291
313 ←

252
35
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Most camps had a wood pile...

and cooking was a problem.

3: Whited G-5 (1890) 1894 NT15 River Yumans
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133 134 PHYSICAL CHARACTERISTICS OF THE REGION.—The territory covered by the Papagos in their migrations, and in which their villages are located, consists of mountain ranges and the intervening valleys. The soil of the valleys contains a considerable proportion of clay, so that it is all called adobe soil. In the mesas or plains occasional strips of sand occur. Along the arroyos, or dry water channels, deposits of gravel are numerous. The arroyos become raging torrents during the rainy season, rendering travel impossible or dangerous during the temporary flood. The soil of the foothills is very rocky. Alkali is present in the soil in varying proportions, giving the characteristic name to the vast stretch of country known as the alkali desert. It is not the presence of alkali, however, that makes the desert, but the absence of water. An abundant water supply renders this alkali soil equal in fertility to any soil in the country. As it is, the valleys contain a great deal of arable land, 137 which is evident from the great areas covered with grass, which form the stock ranges, and from occasional sections where weeds grow so luxuriantly after the rainy season as to overtop a man on horseback. Some portions of the valleys are covered with mesquite trees and bushes, and also sagebrush, but these sections produce abundant crops when irrigated.

132 CLIMATE.—The climate is very mild, being neither extremely cold in winter nor hot in summer. The mean average temperature during the summer of 1890 was 81.3°, and during the winter of 1889–1890 it was 52.6°.

312 WATER SUPPLY.—There are occasional wells found among the Indian villages. Natural water holes are quite numerous, and by raising embankments of earth in favorable localities the Papagos make huge ponds or reservoirs, which they call tanks. These natural and artificial reservoirs are only serviceable for the temporary storage of water, and toward the last they become filthy mudholes. The Indians, however, continue to use the water as long as it can possibly be considered a fluid. In one place the Papagos have dug a well 60 feet deep, and with incredible labor have made a footpath from the top of the ground to the level of the water.

Water is found by boring at a depth of from 200 to 600 feet, but no flowing wells have yet been obtained in the territory. The water in the wells rises from 50 to 150 feet, and then is raised to the surface by steam pumps. The Indians, however, have not the financial resources with which to sink or operate artesian wells. When their tanks are exhausted they remove with droves and herds to the valleys and canyons in the mountains, frequently crossing over into Mexico.

137 TIMBER.—The varieties of timber within the Papago range are the willow, cottonwood, mesquite, palloverde, and on the southern and western mountain slopes the oak. The mesquite is the most common timber, as it grows freely on the mesas. It rivals the hickory as firewood, throwing out great heat, and the coals retain fire even longer than coals of hickory. The mesquite, however, is very easy to cut, and is handled with far less labor than hickory.

137 FRUITS AND NUTS.—The sahuaro (giant cactus), which grows on the rocky soil of the foothills and covers the moderate mountain ranges, rises in height from 10 to 60 feet, and is a mass of vegetable matter, supported by an internal skeleton of ribs or poles of woody fiber. The fruit of this remarkable plant grows out of the top of the trunk and arms, and constitutes an important article of food, the Papagos almost living upon it during June, July, 272 and a part of August. They gather it with long poles, and eat it either fresh or after it has been dried. They make 267 from the juice a sirup and a drink which is slightly charged with alcohol. Although the ribs of the sahuaro are [273] very valuable, the Indians never destroy the plant, and are greatly incensed if a white man cuts one down; but [313] when the cactus dies and the vegetable matter dries, powders, and falls away, leaving the ribs exposed and bare, they are used as supports for the dirt roofs of adobe houses, for the sides of houses when plastered with mud, for poultry and pigeon houses, and other small structures.

262 The Papagos eat the fruit of the prickly pear cactus and make a sirup from its juice; from the mescal (sweet [273] aloe) a highly intoxicating drink is made. The root, which is bulbous, grows partly under and partly above the ground, and when roasted it is very delicious, and great quantities are consumed by the Papagos. They dig out of the ground a vegetable which appears to be a species of wild onion, but they call it a groundnut, and relish it [388] highly when boiled. A very useful plant found in large quantities, called the soap plant (amole), forms a substitute for soap.

282 The tannin root, resembling the sweet potato in appearance, grows in great profusion. It contains a large portion of tannic acid, and is a substitute for the astringent barks, hemlock and oak, which are used in tanneries.

262 FOOD.—In addition to the fruits, nuts, and flesh already mentioned, their food consists of wheat flour (usually 252 formed by the women on a metate) prepared in simple ways, parched wheat and corn, boiled wheat and corn, flour made from the mesquite bean, beans, boiled squash, green and dried squash seeds, beef, and poultry.

181 INDUSTRY.—The Papagos seem to be esteemed by the whites in general as the best Indians in the territory. [464] They are industrious, and are good help in mines, on ranches, in the harvest field, and on stock ranges. They easily learn the mechanical arts, and can set and handle mining drills as well as white men. The engineer at the Quijotoa mines said that his assistant was a Papago, and that he was fully competent to run the engine.

[912] In practical irrigation the Indians are conceded to be the superiors of the whites, and in their domain this is the foundation of agricultural skill. When properly educated there can be no doubt of their ability to acquire the scientific principles of the art.

241 GRAIN.—The roving Papagos, those living off the reservation, raise only grain enough, principally wheat and corn, for their own use. Squashes, melons, and sugar cane make up the list of their common crops. Cultivation with them consists in scratching the ground with their stick plows and planting the seed. They pay no attention whatever to weeds. They inclose small fields of fertile ground in the mesas with brush fences and then plant after a rain at the right season. If it rains in November, they plant wheat. Rain in December will insure a good growth of straw, but rain in February will be necessary to mature the berry. The failure of rain in any of the 3 months will prevent planting or about ruin the crop which has been started. Owing to the uncertainty of propitious rains they obtain crops, apart from irrigation, only about once in 6 years.

Their wheat is white, a short, plump berry, of remarkably good quality. In the off years they resort to the reservation, raise a little grain, and "pack" it to their villages. Corn, squashes, sugar cane, and melons are raised after the summer rains.

252 412 They grind grain on an inclined stone, called a metate, using a smaller stone, about the size of a brick, called a mano, as the crushing power. A handful of whole grain is placed at the top of the metate, a part of it is scattered over the surface of the stone with a dexterous flirt of the hand, and it is then powdered by two or three energetic rubs with the small stone. The whole process resembles that of washing clothes with a washboard. The flour is caught in a bowl as it falls from the metate, is clean and free from grit, and contains all the nutriment of the grain.

272 252 [234] Parched wheat, when ground in this manner, is mixed with water, forming a palatable drink, called penole. Corn is never ground raw, but after it has been boiled, and the meal is pressed and rolled up in soft corn husks and forms their bread for journeys. It is superior in taste, in my judgment, to any kind of corn bread made by the whites. They manufacture a kind of cheese from milk, but have no process for butter making.

231 STOCK.—The Papagos have small herds of stock and droves of horses. These constitute their subsistence, but such possessions can not be large in view of the uncertainty of water. Nearly every family has a few fowls. Their wants are few, and these are easily satisfied. They are self-supporting, and no charge on the government for either food or clothing.

493 An occasional farm wagon was found in a village, but in Ki-ki-wah there were 4. This village is about 90 miles from Tucson and 10 from the Mexican line.

224 [439] GAME.—Various species of deer abound, and in season the markets of the whites are supplied with venison by the Indians. Mountain sheep and goats are also brought in by them, but in less numbers than deer. Black and cinnamon bears are occasionally killed. The cotton-tail rabbit abounds, and is in demand for the table. The flesh is white, and fully equal to chicken in delicacy of flavor. Dangerous wild animals are also killed by the Indians in considerable numbers. The most formidable of these is the mountain lion. This animal destroys young stock, and is therefore hunted with zeal by the Papagos. The pelts possess a trifling value. The wildcat and civet cat are very numerous. The coyote, fox, jack rabbit, and skunk make up a group of animals which are pests, though not dangerous ones. The jack rabbit is sometimes used for food.

223 BIRDS.—Among the birds useful to Indians are the quail, dove, mocking bird, and cardinal bird. These are trapped with great success by them, the quail and dove for food, the others for household pets, their sale forming quite an income. Hawks, owls, and crows abound. Wild ducks, geese, bitters, herons, and snipe are killed in their migration back and forth between Mexico and California. It will be seen that the Indians have many food resources on wing and foot, valuable for consumption or sale.

312 333 DWELLINGS.—Six kinds are used among the Papagos, and about two-thirds of the houses are made of adobe, the rest being constructed of wood and brush. They consist of but one room, and have flat roofs built on rafters of small trees. There is no uniformity as to the size of the houses. The adobe houses are made in an open frame of four compartments from a gray mud or clay mixed with short cut straw or hay. This mold is placed upon the ground, filled with the soft adobe, packed firmly, and then the frame or mold is removed and the brick left to dry. The usual size of a brick is 4 by 8 by 16 inches.

[356] The Papagos are cleanly in their habits. They sweep the dirt floors of their houses, and in some cases the ground around them. No vermin of any kind was found in any of their houses.

291 [771] CLOTHING.—The men wear boots or shoes, pants and shirts, and straw or felt hats. A canvas jacket is worn on cool days or on a journey. The women wear shoes, stockings, and skirt, and wrist blankets are quite common with both sexes, with the women serving as shawl and head covering. The women sew nicely by hand, using thimbles. They also use sewing machines, of which there were three in Ki-ki-wah.

181 [578] [544] MORALS.—The men were generally represented to me to be truthful and honest and the women to be virtuous. Prostitution is said to be unknown among them. This may be due to the fact, as some claim, that wives are taken and abandoned at will. Occasionally a man was found with 2 wives.

Their honesty was tested in various ways on our trip. The outfit of 2 wagons was left unguarded for a whole day when we made the trip from Tanketa to Fresnal and neighboring villages, and not a thing was disturbed. Twice also we left villages forgotten articles were brought to us by men on horseback. These articles would not have been missed, and might have been kept by them with perfect impunity. The Papagos are not addicted to

660